COLLAPSIBLE SEAT WITH A COLLAPSIBLE PROTECTIVE STRUCTURE

This invention relates to a seat that can be deployed from a collapsed position to an unfolded position, including but not limited to a baby or infant carriage, comprising a collapsible protective structure made in a flexible material, wherein it comprises:

- an upright;
- a jointed linkage for the unfolding of the seat; and
- support means for the protective structure;

wherein the support means comprise at least one support unit that is elastically bendable through buckling, this support unit being jointed (i) to a first point on the upright, and (ii) to a second point on the jointed structure, and being adapted so as to take a bent buckling position when the seat is unfolded.

As is well known, the seats of the type mentioned above allow a relatively simple unfolding of a collapsible structure, such as a pushchair for children. Such pushchairs are available in a variety of collapsible structures, e.g. 2-D folding, 3-D folding, or umbrella-fold.

The seats of the type mentioned above further comprise a collapsible structure protecting the child. This structure consists in covering made of a flexible material, that is fixed (i) to the upright, and (ii) to one or more points of the jointed structure. When unfolding the pushchair, the fixing points of the protective structure move apart from each other. The flexible material forming the protective structure then spreads tight.

However, the seats of the above-mentioned type are not entirely satisfactory. Indeed, on such seats, the protective structure offers a lateral protection with a surface limited to the boundaries of the above-mentioned fixing points, and a restricted inner volume.

The main purpose of the invention is to resolve this inconvenience, by providing a collapsible seat with an easily foldable protective structure, offering a large protection surface, particularly on the sides of the pushchair, as well as a significant inner volume.

For this purpose, the invention relates to a collapsible seat of the above-mentioned type, wherein the support means comprise at least one support unit that is elastically bendable through buckling, this support unit being jointed (i) to a first point on the upright, and (ii) to a second point on the jointed structure, and being adapted so as to take a bent buckling position when the seat is unfolded.

The seat according to the invention could have one or more of the following characteristics, taken alone or according to all the possible technical combinations:

- the upright comprises a sliding block sliding on the upright along an axis, such sliding block being blocked rotationally around this axis; the jointed structure for the unfolding of the seat comprises, seen along a direction different from said axis, a jointed deployment triangle, such deployment triangle comprising (i) a first side attached to the upright between a first joint located on the upright, and a second joint located on a point of the sliding block, (ii) a second side jointed on the sliding block by the second joint, and (iii) a third side jointed on the upright by the first

joint, and on the second side by a third joint; and said first point is located on the sliding block;

- the ratio of the distances separating the first and second points, in the unfolded position and in the collapsed position of the seat, is comprised between 0.85 and 0.95;

- said ratio is comprised between 0.88 and 0.92;

- the ratio between (i) the lateral spacing of said second point in relation to the axis in the unfolded position, and the stroke length of the sliding block between the unfolded position and the collapsed position, is less than 1;

- the jointed structure makes a jointed pseudo-parallelogram, said second point being located close to one of the vertices of the jointed pseudo-parallelogram;

- the protective structure (85, 87) is removable; and

- the seat comprises at least one pair of collapsible legs, each of which is associated with a jointed structure, and with a support unit.

Exemplary embodiments will now be described in relation to the annexed drawings, in which:

- Figure 1 is a perspective view of a first structure of a seat according to the invention in the unfolded position, fitted to the rear side of a pushchair;

- Figure 2 is a perspective view of a second structure of a seat according to the invention, in the unfolded position, fitted to the front side of a pushchair;

- Figure 3 is a similar view to that of Figure 2, in which the structure is in the collapsed position;

- Figure 4 is a detailed view of the rigidifying means in the unfolded position of the second structure; and

- Figure 5 is a front perspective view of the pushchair equipped with a protective covering according to the invention.

Figure 1 illustrates the unfolding of the two rear legs of a self-carrying pushchair, adapted to support and transport a child.

This pushchair comprises a central upright 1, a sliding block 3, sliding on the central upright 1 along an axis X-X', two collapsible legs 5 and a jointed structure 7 for the simultaneous unfolding of these legs.

The central upright 1 comprises two rods 9 parallel to the axis X-X'. These rods 9 are held in place (i) at their upper end, by a steering wheel 11 and (ii) at their lower end, by a supporting part 13.

The steering wheel 11 comprises a part 14 of substantially ovoid shape. This part 14 is equipped with three openings 15 which make it possible to easily guide the pushchair, notably with only one hand.

The sliding block 3 comprises an extended part in relation to axis X-X', drilled with two central holes 17 parallel to axis X-X'. The rods 9 of the central upright 1 slot into the holes 17 of the sliding block 3. Thus, the sliding block 3 can freely slide along the rods 9 of the central upright 1 between the steering wheel 11 and the supporting part 13.

The sliding block 3 is moreover equipped with locking means 18, made of for example a friction brake or a latch mechanism. These locking means 18 make it possible to block the sliding block 3 in a position close

any one of the far ends of its stroke along the rods 9 of the central upright 1.

Additionally, the two rods 9 make it possible to lock the sliding block 3 in rotation around the sliding axis X-X'.

As illustrated in figure 1, the axis X-X' is slightly inclined in relation to the vertical, when the pushchair is resting on the ground in the unfolded position.

Each rear leg 5 of the pushchair represented in figure 1 is equipped with a wheel 19, and its collapsible structure 7.

This collapsible structure 7 comprises, seen according to a direction Y-Y' different from the axis X-X', a first jointed deployment triangle 21. The triangle 21 is outlined by a chain dotted line in figure 1.

The first side 22 of the deployment triangle 21 is attached to the central upright 1. It is delimited by a first joint 23 positioned on the supporting part 13 and by a second joint 25 positioned on the sliding block 3.

The deployment triangle 21 comprises a second side 26 created by a connecting bar 27 jointed on the sliding block 5 by the second joint 25.

The third side 28 of the deployment triangle is constituted by a rigid plate 29, jointed on the supporting part 13 by a first joint 23 and jointed by a third joint 31 on the outside of the connecting bar 27 facing the second joint 25.

This rigid plate 29 is substantially triangular in shape. It is cut out so as to reduce the weight of the structure.

The first joint 23, connecting the supporting part 13 and the rigid plate 29, comprises a hinge 33 extending

longitudinally along the axis Y-Y', according to a slightly inclined direction in relation to the horizontal when the pushchair is resting on the ground in the unfolded position.

Moreover, the axis Y-Y' makes with the axis X-X' an angle less than 90°, so as to allow the radial deployment of the legs 5 in relation to the axis X-X' during the unfolding of the pushchair.

This hinge 33 comprises two jointing points 35 separated according to the direction Y-Y'. These points 35 are located close to the two vertices of the rigid plate 29. The third joint 31 is located close to the third vertex of the plate 29.

In this first embodiment of the structure 7, the leg 5 is integral to the end of the connecting bar 27 representing the second side 26 of the deployment triangle 21.

We will now describe an exemplary unfolding of the structure 7, from a collapsed position to the unfolded position represented in figure 1.

Initially, the sliding block 3 is fixed in the high position close to the steering wheel 11 via locking means 18.

In this position, the connecting bar 27 creating the second side 26 of the deployment triangle 21 and the rigid plate 29 creating the third side 28 of the deployment triangle 21, are positioned substantially parallel to the axis X-X' of the central upright 1.

Consequently, in this position, the deployment triangle 21 is flattened. The leg 5 fixed to the extension of the connecting bar 27 is in the collapsed position, close to the central upright 1.

In order to unfold the rear legs of the pushchair, the locking means 18 are released. The sliding block 3 is therefore pushed along the axis X-X' towards the supporting part 13. The distance between the first joint 23 and the second joint 25 decreases as the displacement progresses. Consequently, the difference between (i) the angle of the first side 22 with the second side 26 of the deployment triangle 21, and (ii) the angle of the first side 22 with the third side 28 of the deployment triangle 21, increases substantially. The vertex of the deployment triangle located near the third joint 31 moves away from the central upright 1. During this movement, the leg 5, fixed to the extension of the connecting bar 27, is distanced from the central upright 1.

When the sliding block 3 reaches its lower position near the supporting part 13, or in contact with the latter, the locking means 18 are activated and the leg 5 is blocked in the unfolded position.

In this position, the rigid plate 29 ensures the supporting of the deployment triangle 21 of the leg 5, as well as its circumferential rigidity in relation to the movement axis X-X' of the sliding block.

A second structure 7A according to the invention represented in figures 2 to 5, allows for the deployment of each of the front legs 5A of the pushchair. This structure 7A is different from the structure 7 described above due to the following points.

As illustrated in figure 2, the third joint 31 between the connecting bar 27 of the second side of the deployment triangle 21 and the rigid plate 29, is placed on an intermediary point of the rigid plate 29.

Moreover, the leg 5A is jointed at the rigid plate 29 by means of a fourth joint 41 located close to the vertex of the rigid plate 29.

The collapsible structure 7A corresponding to each leg 5A further comprises a supporting part 43 constituted of a second connecting bar, which is jointed, on one hand, by a point 44 of the sliding block 3 and, on the other hand, by an intermediary point 45 of the leg 5A located below the joint 41. As illustrated in figure 2, the supporting part 43 passes through a hole 47 in the rigid plate 29.

This structure 7A makes a pseudo-parallelogram which has as its vertices (i) the fourth joint 41 and the intermediary point 45 of the leg 5A and (ii) the point 44 of the sliding block 3 and the middle of the hinge 33.

Differing from the first structure 7, this structure 7A further comprises supporting means 49 for a collapsible safety structure, and retractable rigidifying means 51.

The supporting means 49 comprise for each leg 5A a blade 53 in an elongated form, made of flexible material. This flexible blade 53 is fixed, on one hand, to a first point 54 on the upper part of the sliding block 3 and, on the other hand, to a second point 55 at the upper end of the leg 5A, close to the jointing point 41 between the leg 5A and the plate 39. The length of the flexible blade 53 is substantially equal to the distance separating its two fixation points when the sliding block 3 is positioned close to the steering wheel 11. Thus, when the pushchair is collapsed, the flexible blade 53 is close to the central upright 1, in a rectilinear position, substantially parallel to the axis X-X', as illustrated in figure 3.

As illustrated in figure 2, the rigidifying means 51 comprise a collapsible rod 61 and a central connection part 62.

This collapsible rod 61 comprises two arms 63 linked together by a hinge 65 close to a first end. The opposite end to the hinge 65 of each of the arms 63 is respectively jointed on the two facing legs 5A. The jointing points of the collapsible rod 61 to the legs 5A are located close to the wheels 19 and define a horizontal and transversal direction when the pushchair is resting on the ground in the unfolded position.

The linking device 62 comprises a pair of compasses constituted of two jointed blades 67 and 69. The first blade 67 is jointed (i) to the central hinge 65 of the collapsible rod 61 and (ii) to the supporting part 13. The second blade 69 is jointed, at one end, to an intermediary point of the first blade 67, and at its other end, to the sliding block 3.

The operating of the second structure 7A is similar to the operating of the first structure 7, with the differences indicated hereafter.

The movement of the sliding block 3 towards the supporting part 13 drives the movement of the leg 5A away from the central upright 1 through the action of the deployment triangle 21. During this movement, the pseudo-parallelogram shape of the structure 7A allows the axis of the leg 5A to be held substantially parallel to the axis X-X', which is favourable to the mechanical resistance of the deployed leg.

In the unfolded position, the supporting part 43 comes in thrust block against the edge of the hole 47, in order to increase the rigidity of the structure.

The geometry of the structure 7A makes it possible to obtain a ratio between (i) the lateral misalignment compared to the axis X-X' of the joint point 41 between the leg 5A and the plate 39 and (ii) the stroke length of the sliding block 3 between the steering wheel 11 and the supporting part 13, that is less than 1. When unfolding the pushchair, the distance which separates the fixing points of the flexible blade 53 when the sliding block 3 is close to the supporting part 13 is shorter than the distance which separates these points when the sliding block 3 is close to the steering wheel 11. The ratio of these two distances is typically comprised between 0.85 and 0.95, preferably between 0.88 and 0.92.

Thus, when the pushchair is unfolded, the flexible blades 53 adopt a significantly bent buckled position, as illustrated in figure 2. This position allows the unfolding of a safety structure supported by the flexible blades 53, as described hereinafter.

Moreover, differing from the first structure 7, and as illustrated in figure 3, the collapsible rod 61 is in a collapsed position in the initial state. The movement of the sliding block 3 towards the supporting part 13 drives the movement of the joint between the two blades 67 and 69 of the linking device 62 away from the central upright 1. Consequently, the first blade 67 of the linking device 62 drives the movement of the central hinge 65 of the collapsible rod 61 away from the central upright 1. When the sliding block 3 comes close to or in contact with the supporting part 13, the collapsible rod 61 is unfolded and strengthens the circumferential rigidity of the two legs 5 in relation to the axis X-X', so that a stiff frame structure is obtained.

In this position, the collapsible rod 61 is adapted for the feet of a child to rest on. Moreover, a strap 70 is fixed between the two legs 5A, parallel to the first collapsible rod 61, allowing the supporting of a pushchair seat.

Alternatively, as illustrated in figure 4, a second collapsible rod 71 similar to the rod 61 can be jointed at the legs 5 parallel to the first collapsible rod 61. The linking device 62 thus comprises a third rod 73 jointed (i) on the central hinge 75 of the second collapsible rod 71 and (ii) on an intermediary point of the first blade 67 of the linking device 62, or directly on the hinge 65.

Moreover, the deployment of this second collapsible rod 71 is identical to the deployment of the first collapsible rod 61. In the unfolded position, this second collapsible rod 71 is adapted to support a pushchair seat.

In another alternative (non represented), it is possible to make the structure lighter by replacing the rigid plate 29 by a two-armed fork. In this case, the two jointing points 35 are placed close to the ends facing the two arms, and the third joint 31 is placed close to the common end of the two arms of the fork.

On the contrary, when rigidity is preferred to lightness, the rigid plate 29 can be solid, so that the surface delimited by the two jointing points 35 and the third joint 31 is solid, with the possible exception of the hole 47 through which the supporting part 43 passes.

Finally, in another alternative (non represented), the second side of the deployment triangle is made by a rigid plate jointed to the sliding block. In this case, the third side of the deployment triangle is made up of a

simple connecting bar, linking the supporting part to the rigid plate.

Figure 5 represents the self-carrying pushchair according to the alternative in figure 4, equipped with a seat 81. The latter is supported by (i) the second collapsible rod 71 and (ii) fixing means (non represented) on the sliding block 3.

Moreover, the backrest 83 of the pushchair is fixed onto the sliding block 3. A protective covering 85 for the child is supported by the two flexible blades 53, and by two similar flexible blades 86, fitted between the top of the sliding block 3 and the rear legs 5. The covering 85 comprises two side covers 87, each of which is fixed along the corresponding blades 53 and 86. A rear cover (non represented) is fixed between the blades 86 to complete the protection of the child. Alternatively, accessories such as a front, fold-away and removable, protection hood or a storage structure can be fixed to the pushchair.

Thanks to the invention which has just been disclosed, it is possible to obtain a collapsible seat with an easily foldable protective structure. Furthermore, this protective structure offers, when the seat is unfolded, a large lateral protection surface, as well as a significant inner volume for the child sitting or lying in the pushchair.

This type of protective structure can be easily adapted to other types of seats, including but not limited to twin strollers, toy pushchairs, high-chairs, fold-away chairs, wheelchairs for physically impaired people.